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15 February 1963

MEMORANDUM FOR : The Record

SUBJECT : OMCART Engine Foreign Object Damage

1. There have been ten instances of engine foreign object damage (FOD) involving the A-12 airplane. Three of these have been minor in nature and have been repaired in the field without delay to the program. Seven have been major in nature and have resulted in the engine being returned to Hartford for repair. Of these seven major FODs, three have involved the J75 engine and the four most recent have involved the JT11D-20 (J38) engine.

2. Although with one exception engine teardown inspection findings particularly on the most recent four instances involving the J38 engine are as yet inconclusive, most indications point to debris left in the airplane nacelle during assembly as the primary cause of damage. Seven of these indications are:

a. Six of the seven major FODs were sustained during installed operation in airplanes with from zero to three hours total flight time. All of these airplanes were assembled in the new production facility.

b. One of the seven major FODs was sustained in airplane number one but at 11 hours of flight time. This airplane was assembled in the old skunk works with less and higher caliber personnel.

c. Reports indicate that a recent X-ray of one airplane in the assembly cycle revealed debris lodged inside a completed section of the assembly.

d. There is no record of damage occurring during uninstalled engine testing.

e. There has been no indication during installed ground running of the tendency to pick up any object from the ground.

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f. Teardown inspection of one of the early J75 engines revealed a battered aircraft type screw lodged in the engine.

g. Preliminary inspection of the first recent D-20 engine reveals impacts and tears which approximate the size of a 1/8 inch diameter bolt or rivet with a 3/16 inch head.

The attachment summarizes the ten occurrences.

3. In spite of the above indications and since the cause in many cases (particularly the most recent of which the engines have not yet been completely inspected) is not firmly established, all possibilities are under consideration. In this light, the nature of damage of one recent case indicates the foreign object to be of a relatively soft but firm make up such as rubber or fiberglass. This unique instance points to an external source such as a rubber protective device used to secure certain airplane components during ground operation or certain anti-radar protective paint. The engine involved is in transit to Hartford for complete teardown and inspection.

4. Since all areas are suspect until proven otherwise, the following corrective actions have been implemented:

a. Evaluation of the use of engine inlet screens during ground runs.

b. All airplanes are X-rayed prior to ground engine operation.

c. Airplane inlet subassembly is shaken and rotated prior to installation to the airplane.

d. Increased inspection of nacelle and inlet prior to engine installation.

e. Increased runway and ramp sweeping and inspection.

f. Personnel procedures tightened during airplane servicing, ground running, and pre-flight.

g. Airplane taxiing procedures tightened to assure against proximity of other aircraft.

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- h. Tighter control of inlet openings during hangar operations.
- i. Re-examination of anti-radar paint and bonding.
- j. Review and tightening of all airplane production assembly and inspection operations.
- k. Review of engine hardware to assure no loose parts.
- l. Detailed inspection of engines involved during tear-down to identify foreign objects.
- m. Security investigation to cover the possibility of deliberate damage.

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Development Division
OSA-50/2

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25X1A -2232-63Summary - Engine Foreign Object Damage

Instance	Engine Model	Engine Serial Number	Date FOD Discovered	Airplane No. Installation	Nacelle, Right or Left Hand	Extent of Damage	Airplane Flight Hours	Engine Disposition
1.	J-75	612096	6/14/62	121	RH	Major	11	Overhaul
2.	J-75	612143	10/5/62	123	LH	Major	0	Overhaul
3.	D-20	644209	Nov. 62	121	LH	Minor	44	#
4.	J-75	612364	1/3/63	123	LH	Minor	41	Field Repair
5.	D-20	644207	1/9/63	122	RH	Minor	1	Field Repair
6.	J-75	612072	1/16/63	124	RH	Major	3	Overhaul
7.	D-20	644211	1/29/63	122	RH	Major	1	Overhaul
8.	D-20	644212	2/1/63	122	RH	Major	2 1/2	Overhaul
9.	D-20	644204	2/13/63	125	RH	Major	0	Overhaul
10.	D-20	644210	2/13/63	125	LH	Major	0	Overhaul

*This FOD discovered during routine overhaul. Date of last installed operation 9/14/62.